Medusaceratops

Medusaceratops is an extinct genus of centrosaurine ceratopsian dinosaur known from the Late Cretaceous Judith River Formation (middle Campanian stage) of Montana, northern United States. It contains a single species, *Medusaceratops lokii*.[1]

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Discovery

Side view of skeleton

The known material of *Medusaceratops* came from a bonebed in the badlands on the west side of Kennedy Coulee adjacent to the Milk River, in the Milk River Natural Area, near Havre, Hill County of Montana. The material was first reported by Sweeney and Boyden (1993), who considered it to represent the southernmost occurrence of *Styracosaurus albertensis*, based on misidentified frill spikes. Trexler and Sweeney (1995) reinterpreted the spikes as eye-socket horncores and noted their similarity to those of the *nomen dubium Ceratops montanus* from a nearby area, however, could not refer the bonebed material to any valid existing taxon. The bonebed, known as the Mansfield Bonebed honoring its landowner, is located on private land and historically has been excavated by several commercial companies. The type material of *Medusaceratops* and other specimens were excavated more recently and have been purchased by the Wyoming Dinosaur Center from Canada Fossils, Ltd., of Calgary, Alberta. Additional material from the same excavation was purchased and accessioned by the Royal Tyrrell Museum of Palaeontology. Canada Fossils, Ltd., also assembled

Medusaceratops

Temporal range: Middle Campanian, 77.5 Ma

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Skeleton at Wyoming Dinosaur Museum formerly referred to *Albertaceratops*

Scientific classification

Kingdom:	Animalia
Phylum:	Chordata
Clade:	Dinosauria
Order:	†Ornithischia
Family:	†Ceratopsidae
Subfamily:	†Centrosaurinae
Genus:	†*Medusaceratops* Ryan, Russell & Hartman, 2010
Species:	†***M. lokii***

Binomial name

†***Medusaceratops lokii***
Ryan, Russell & Hartman, 2010

two composite skeletons using the Mansfield Bonebed material which are in the collections of the Wyoming Dinosaur Center and the Fukui Prefectural Dinosaur Museum, however neither of the casts has an exact reconstruction of *Medusaceratops* as it was later described.[1]

The name *Medusaceratops* was coined by Canadian paleontologist Michael J. Ryan of the Cleveland Museum of Natural History in 2003 in a dissertation. Its fossils were subsequently confused with those of *Albertaceratops*, another centrosaurine ceratopsian from Alberta which had been described by Ryan in 2007. Later, Ryan realized that the Mansfield Bonebed fossils did not belong to *Albertaceratops*. *Medusaceratops* was formally described and name by Michael J. Ryan, Anthony P. Russell and Scott Hartman in 2010 and the type species is *Medusaceratops lokii*. The generic name refers to Medusa, a monster from Greek mythology whose "hair" consists of snakes and its gaze could turn men to stone, alluding to a unique trait of this genus - the large, thick snake-like spikes that extend to the sides of the frill, in combination with Latinized Greek *ceratops*, meaning "horned-face", which is a common suffix for ceratopsian genera names. The specific name *lokii* honors Loki, a troublemaking god in the Norse mythology, in reference to the years confusion that surrounded the taxonomic designations of the Mansfield Bonebed material before it was given its own name.[1]

The Mansfield Bonebed material was collected from the upper part of the Judith River Formation, in a region where it is lithologically equivalent to the Oldman Formation of Canada. The bonebed is located at approximately the same level as the holotype of *Albertaceratops*, dating to 77.5 million years ago, to the middle Campanian stage of the Late Cretaceous. Thus, *Medusaceratops* was considered to represent the oldest known chasmosaurine,[1] until the naming of *Judiceratops* by Longrich (2013), also from the Judith River Formation, but from an area equivalent to the lower Oldman Formation or upper Foremost Formation.[2]

However, Ryan had already indicated that part of the Mansfield material represented not a chasmosaurine, but a centrosaurine. Chiba *et al.* in 2017 described new material of *Medusaceratops* from the Mansfield Bonebed, found in 2011 and 2012 by David Trexler, indicating the presence of traits that were characteristic of Centrosaurinae in the skeleton of *M. lokii*. They concluded that all the material could be referred to a single species. The phylogenetic analysis conducted by the authors indicated that *Medusaceratops* was not a member of Chasmosaurinae after all, but rather an early centrosaurine ceratopsid that was more closely related to Centrosaurini and Pachyrhinosaurini than Nasutoceratopsini.[3]

Description

Two partial parietals (frills) that are housed at the Wyoming Dinosaur Center were chosen as the type material of *Medusaceratops*, including the holotype WDC DJR 001 and the paratype WDC DJR 002. Although all the chasmosaurine material from the Mansfield Bonebed was thought to be referable to *Medusaceratops*, which totals at several hundred individual elements, upon its original description only these two partial frills have been scientifically described while the rest of the material was being reexamined. Many of the other elements are not diagnosable to a genus level and can only be confidently referable to Ceratopsidae.[1][3]

Restoration

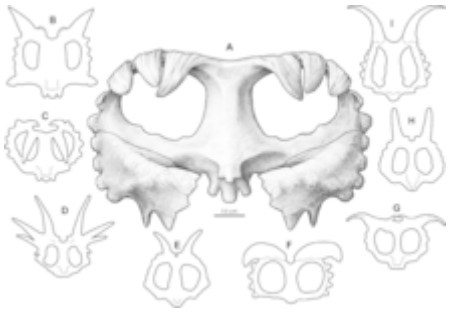
Upon its original description *Medusaceratops* was thought to represent a chasmosaurine. It was suggested that based on its type material alone, *Medusaceratops* is unique among Chasmosaurinae in having only three epiparietals (frill spikes) on each side of the frill. The first frill spike pair is large and the second is smaller, and both are uniquely widened at base, pachyostotic, curve down the sides of the frill, and are depressed down the front of the frill. The third frill spike pair is small and triangular, unmodified in comparison to early chasmosaurines, but similarly depressed, and borders the squamosal bone. The highly broadened and curved first frill spike pair of *Medusaceratops* closely resembles

the third pair of the frill ornamentation of *Albertaceratops*, however *Medusaceratops* was thought to differ (like all chasmosaurines) in lacking tab-shaped, frequently overlapping fourth to seventh pairs of the frill ornamentation of centrosaurines.[1]

This was challenged in 2018, by the description of additional Mansfield Bonebed material assignable to *Medusaceratops*. It became apparent that the 1-3 frill spikes mentioned above are in fact spikes 2-4. The first epiparietal is small and variably procurving and thus was misinterpreted before. At least one more epiparietal pair was also identified (after the fourth), resulting in a total of at least 5 pairs, consistent with centrosaurines like *Albertaceratops* and *Wendiceratops*, but not with chasmosaurines. The midline ramus of *Medusaceratops*, a bone separating the two sides of the frill, was also among the newly described material. It is broad, resulting in rounder and smaller frill fenestrae (holes) like in other centrosaurines. Thus, the new study reassigned *Medusaceratops* to Centrosaurinae, among which it is most similar to *Albertaceratops* and *Wendiceratops*.[3]

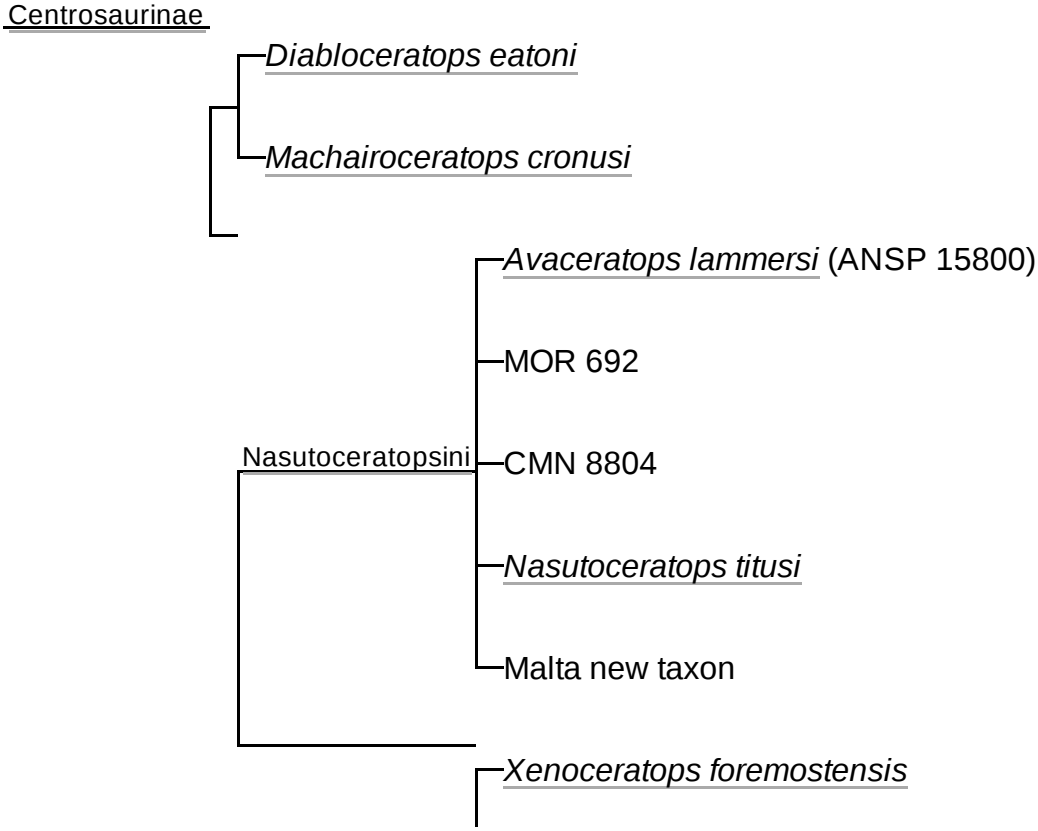
Classification

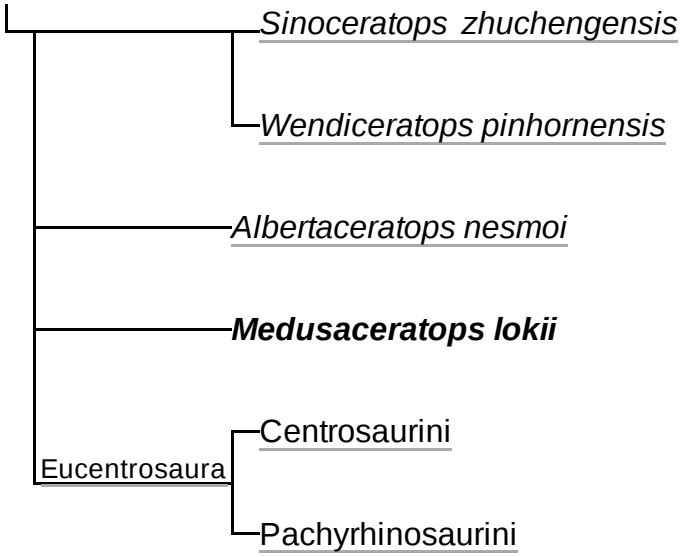
Among valid ceratopsids from the Judith River Formation, *Medusaceratops* can be directly distinguished from centrosaurine *Avaceratops*,[3] and chasmosaurines *Judiceratops* and *Spiclypeus*[4] based on its unique frill ornamentation. It differs from chasmosaurine *Mercuriceratops* based on its less unique squamosal bone,[5] as evident from newly described squamosal bones of *Medusaceratops*.[3] All material previously assigned to the centrosaurine *Albertaceratops* from the formation is now assigned to *Medusaceratops* or considered too fragmentary.[1][3]



Reconstruction of parietals of various centrosaurines, including *Wendiceratops* (A) showing 5 epiparietal pairs and broad midline ramus. *Medusaceratops* itself is marked by letter (F).

The cladogram presented below follows a phylogenetic analysis by Chiba *et al.* (2017) who redescribed *Medusaceratops* as a centrosaurine:[3]





See also

- Timeline of ceratopsian research

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